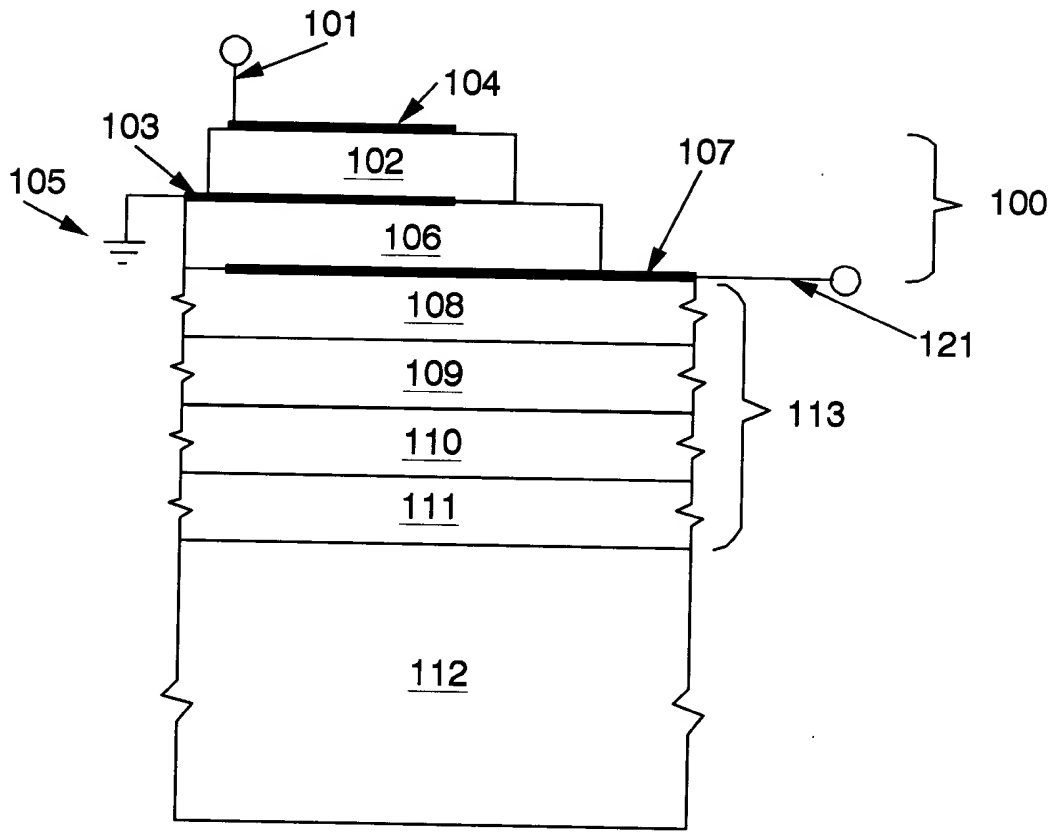

FIG. 1

PRIOR ART

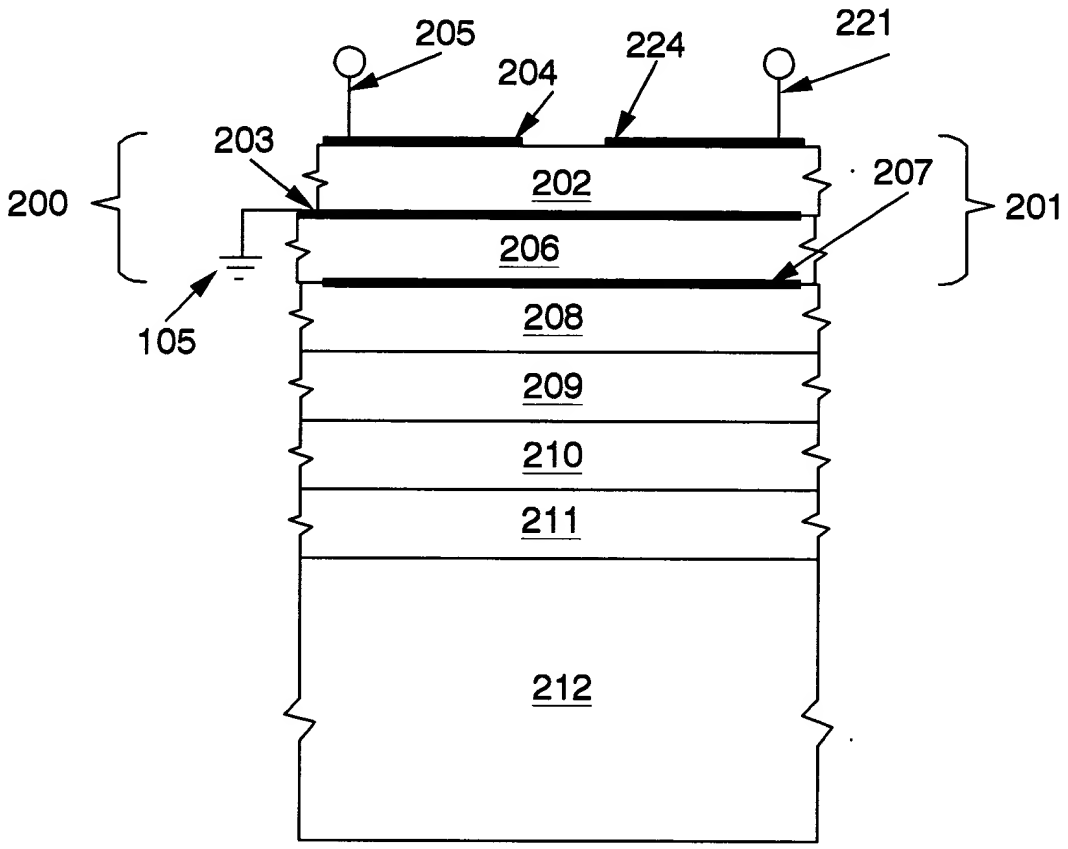

FIG. 2

PRIOR ART

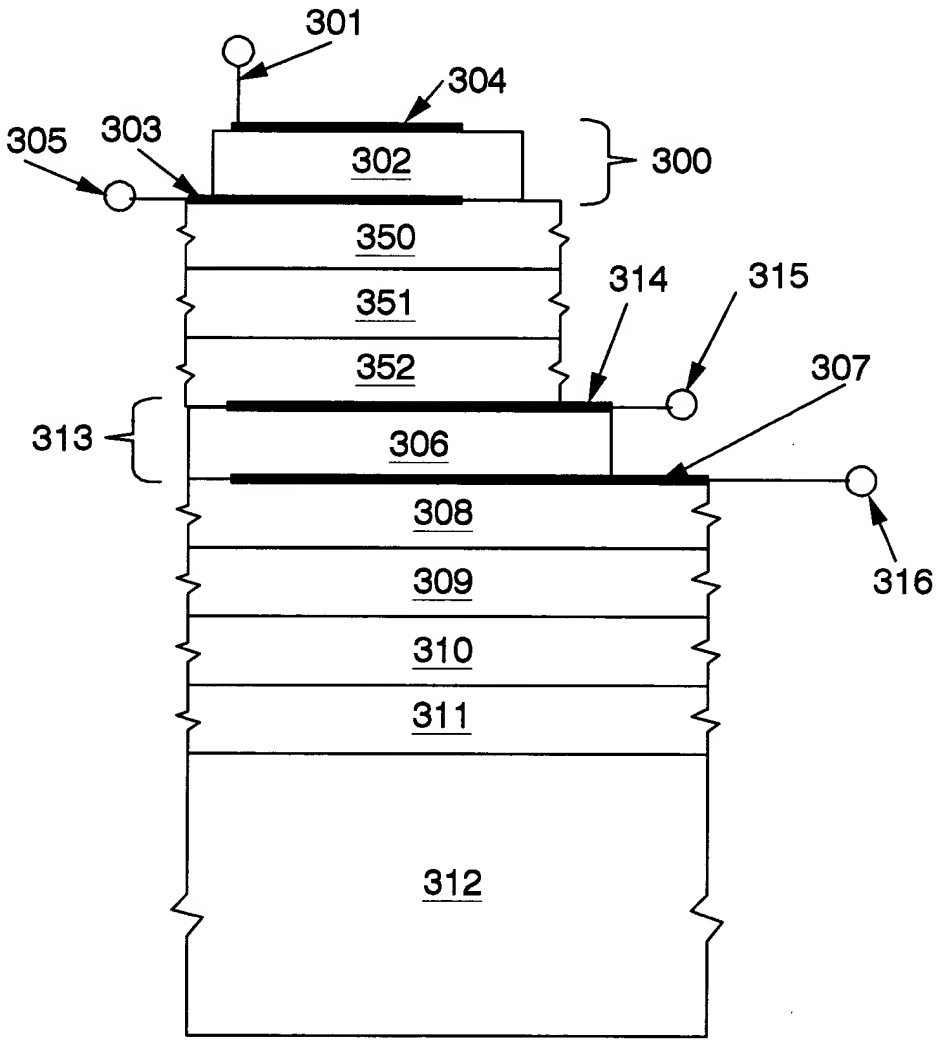
301
304
305
303
302
300
350
351
352
314
315
307
313
306
308
309
310
311
312
316

FIG. 3

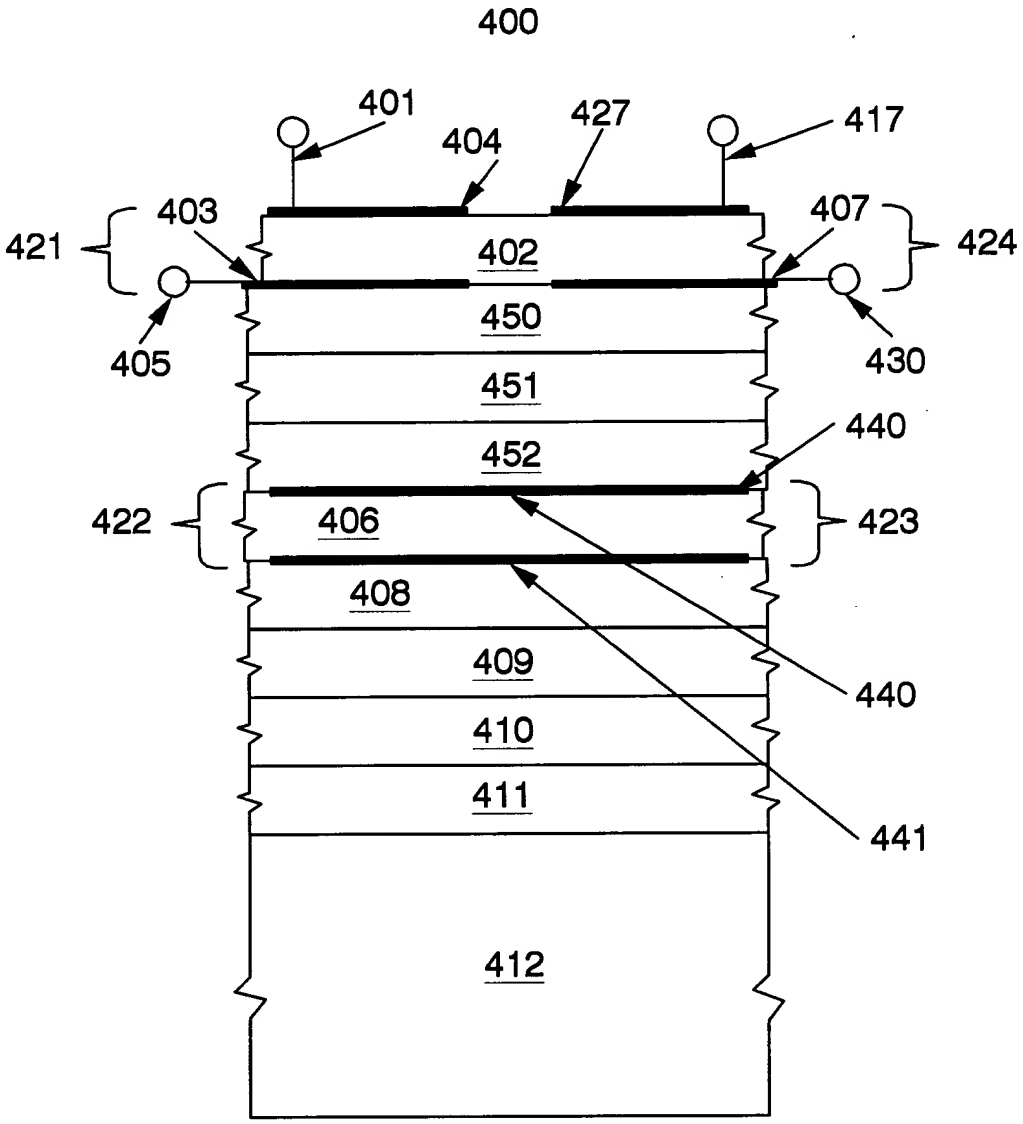
400
401
404
427
417
403
407
421
424
402
450
405
430
451
440
452
422
406
423
408
440
409
410
411
441
412

FIG. 4

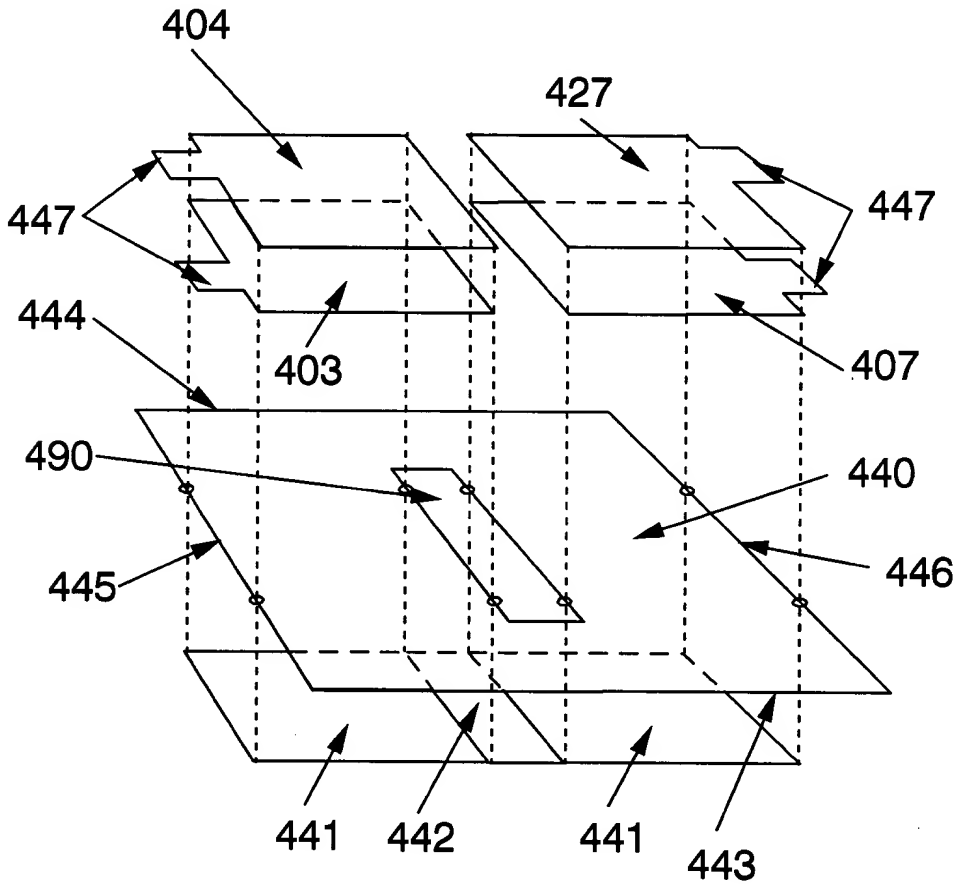

FIG. 5

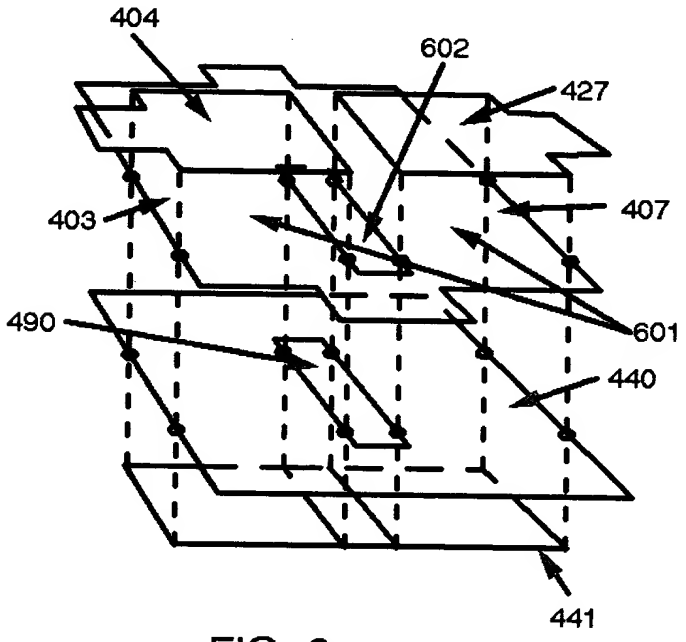

FIG. 6

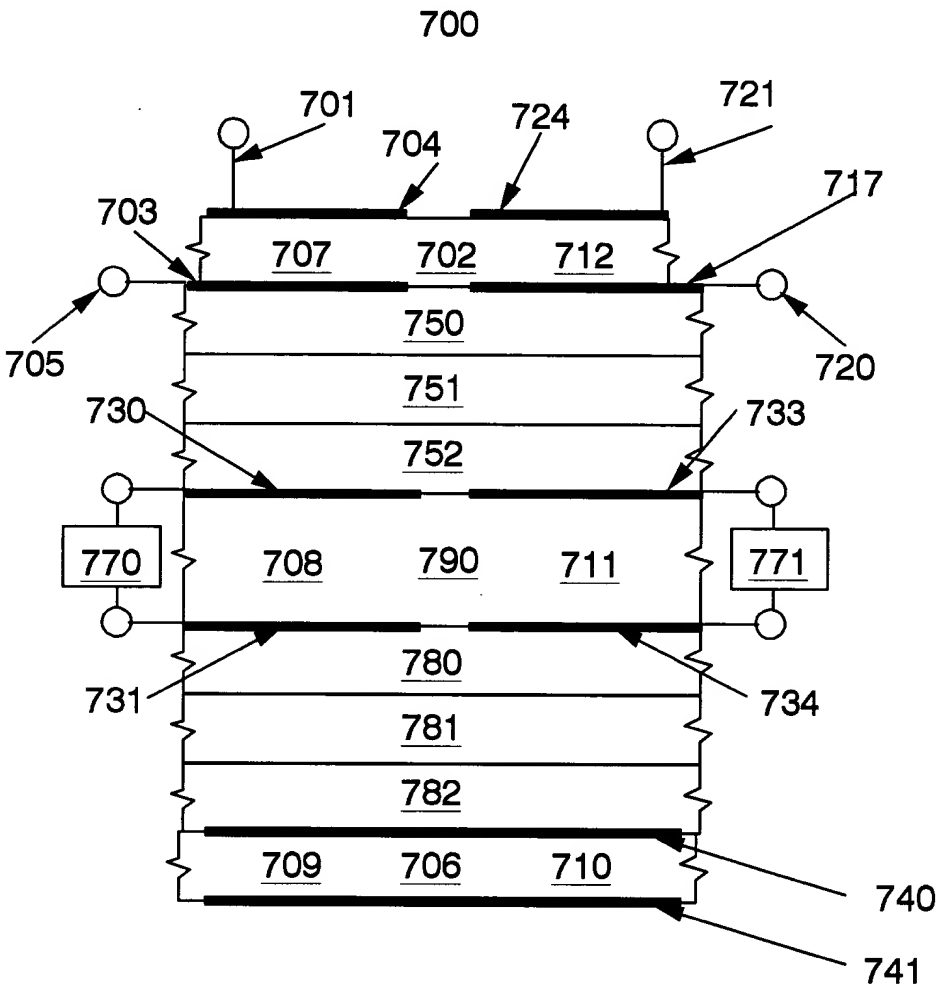
700
701
704
724
721
717
703
707
702
712
705
750
720
751
730
733
752
770
708
790
711
771
780
731
734
781
782
709
706
710
740
741

FIG. 7

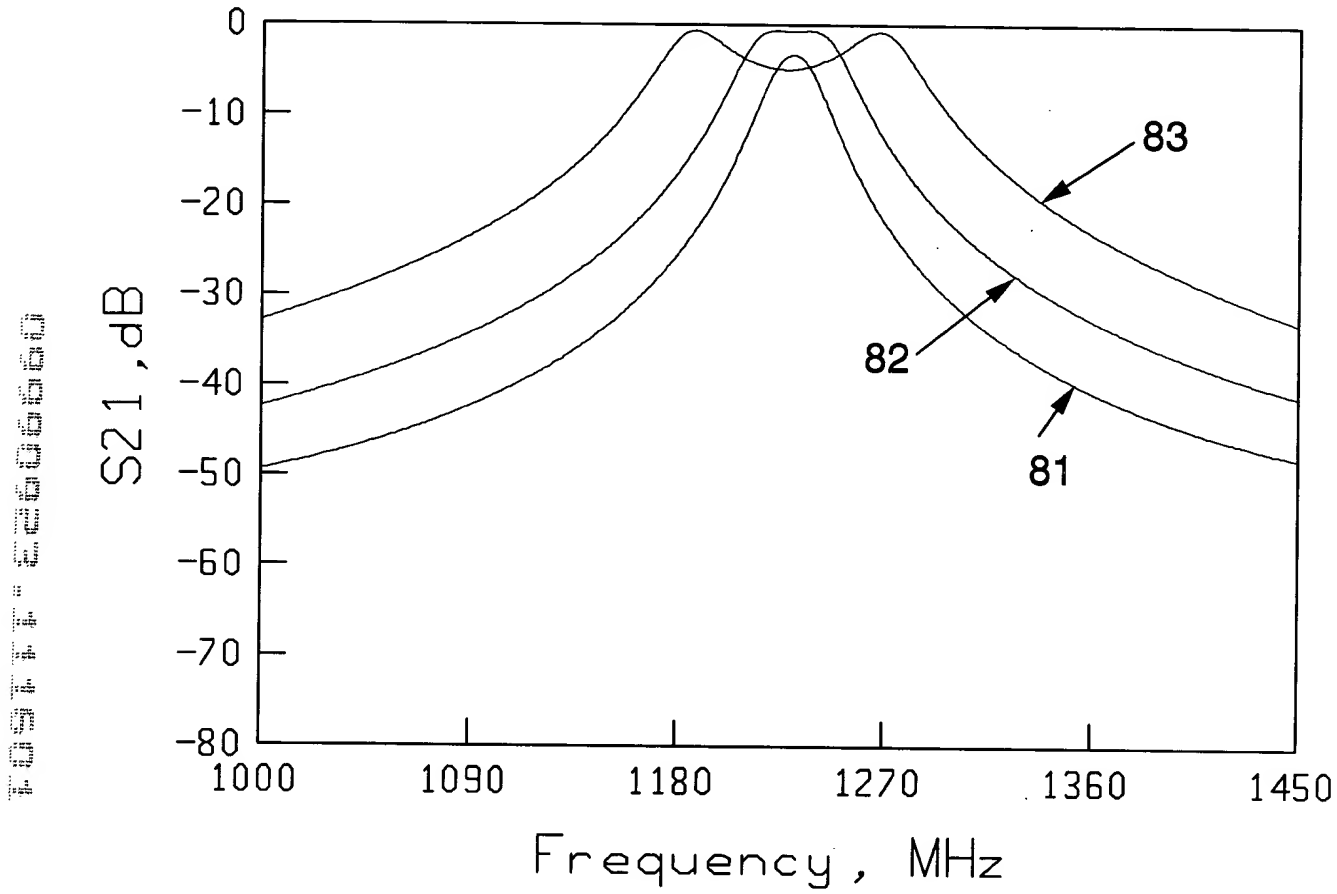
0
-10
-20
-30
-40
-50
-60
-70
-80
S21,dB
1000
1090
1180
1270
1360
1450
Frequency, MHz
83
82
81

FIG. 8

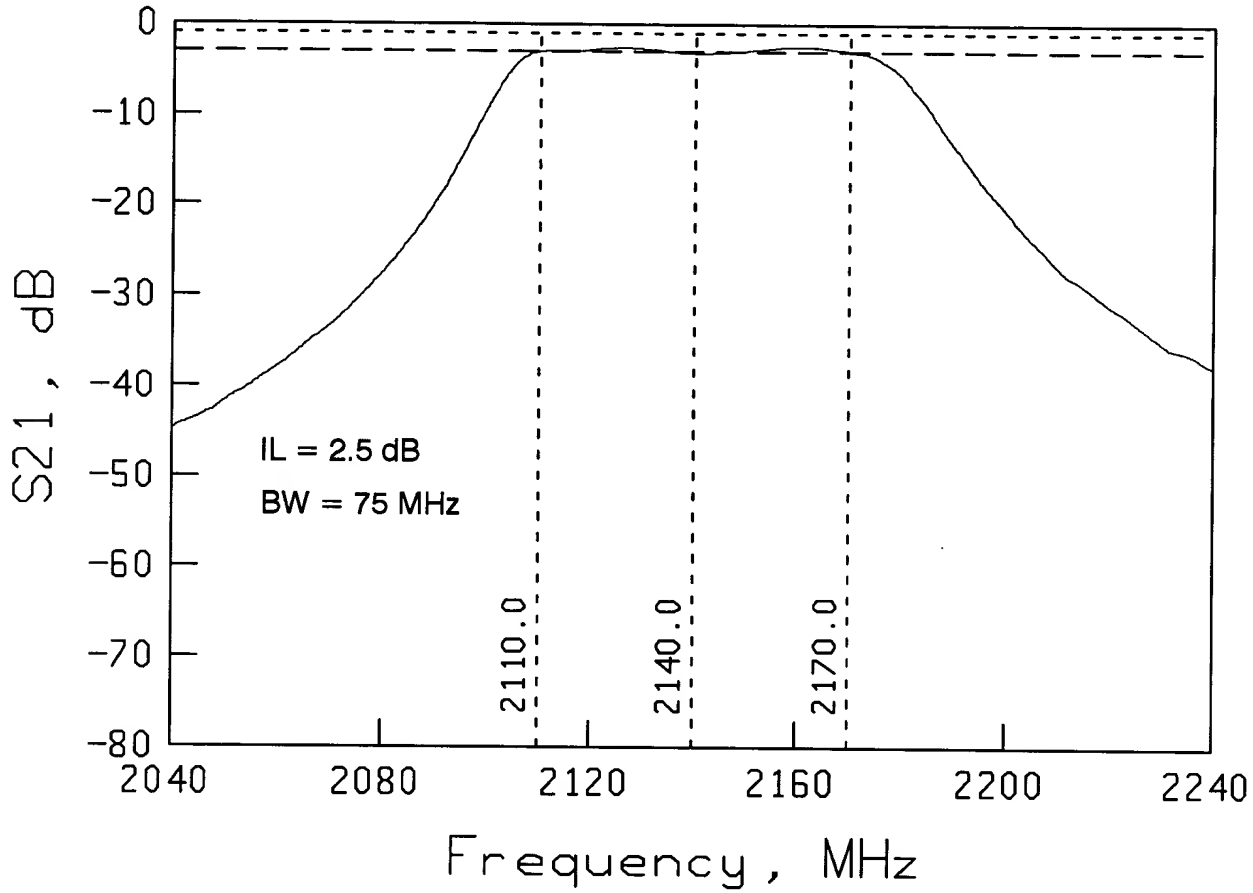
0
-10
-20
-30
-40
-50
-60
-70
-80
S21, dB
IL = 2.5 dB
BW = 75 MHz
2110.0
2140.0
2170.0
2040
2080
2120
2160
2200
2240
Frequency, MHz

FIG. 9

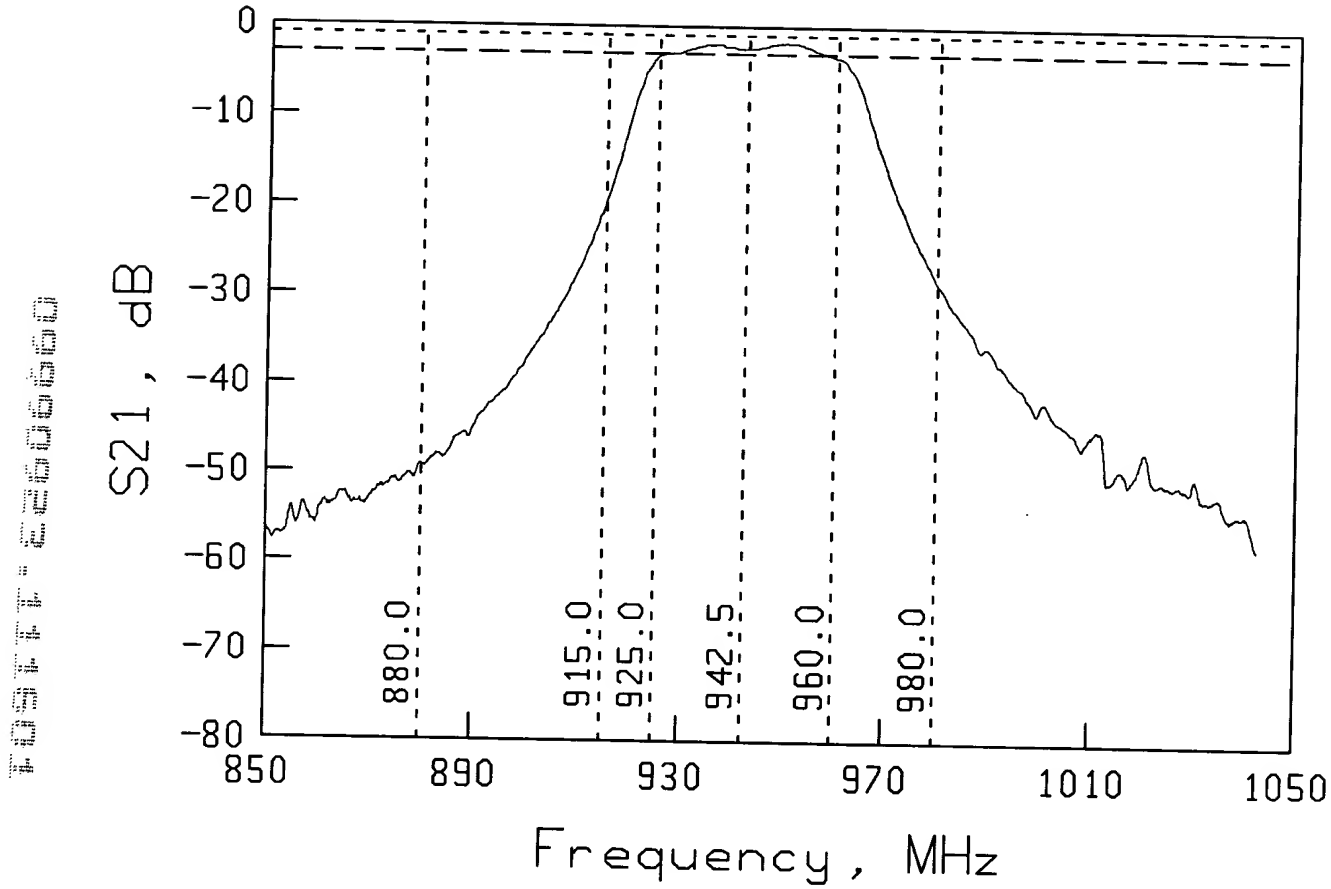
0
-10
-20
-30
-40
-50
-60
-70
-80
S21 , dB
880.0
915.0
925.0
942.5
960.0
980.0
850
890
930
970
1010
1050
Frequency , MHz

FIG. 10

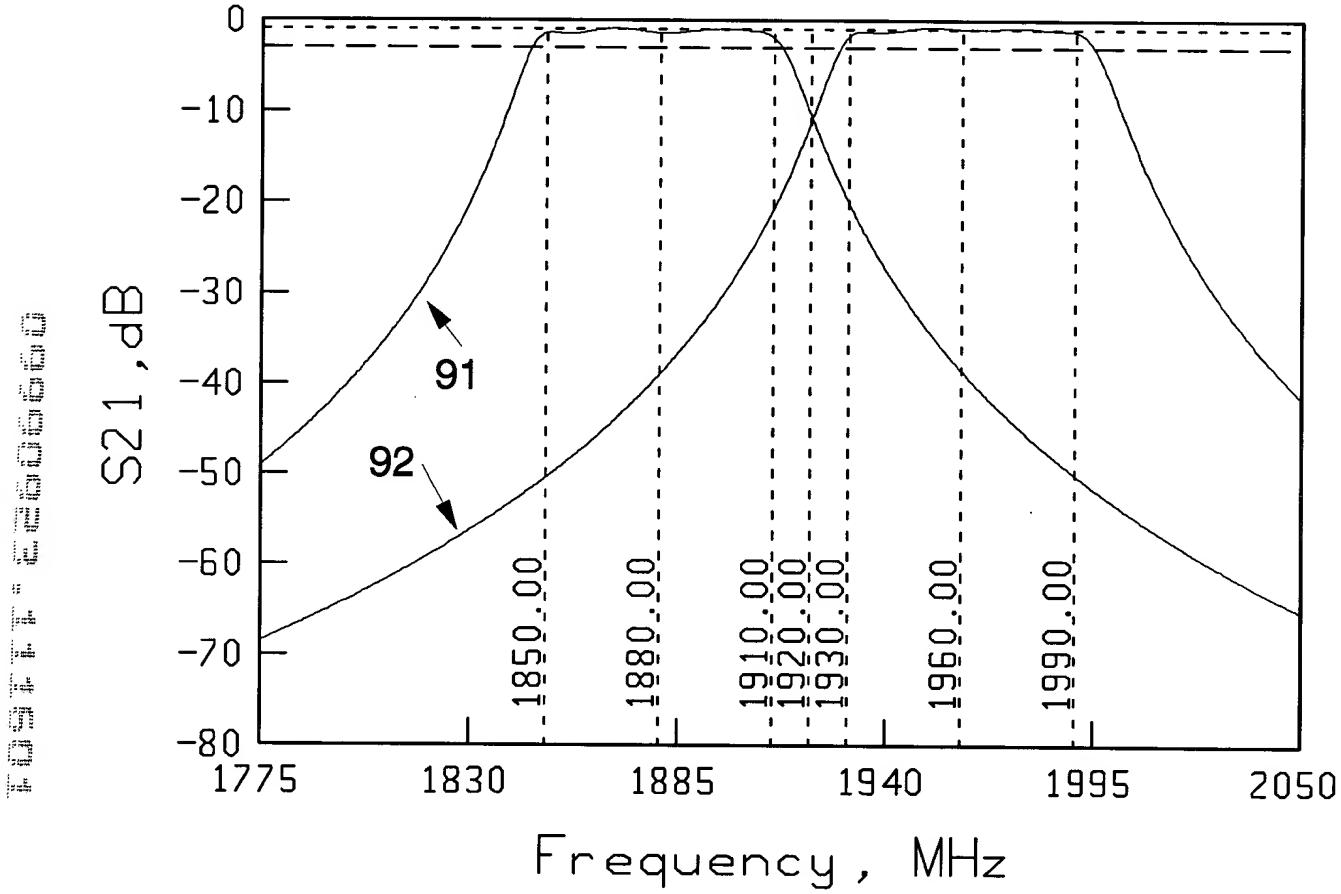
0
-10
-20
-30
-40
-50
-60
-70
-80
S21,dB
91
92
1850.00
1880.00
1910.00
1920.00
1930.00
1960.00
1990.00
1775
1830
1885
1940
1995
2050
Frequency, MHz

FIG. 11

TABLE OF MATERIAL VALUES

Layer (a)	Impedance(b)	Material	Fig. 9 Thick. (c)	Fig. 10 Thick. (c)	Fig. 11 (h) Thick. (c)	Fig. 11 (i) Thick. (c)
404/424	17.3	Al	0.22	0.52	0.28	0.21
402	36.8	AlN	2.22	5.0	2.47	
403/407	17.3	Al	0.22	0.52	0.295	0.205
450	12.7	SiO2	0.69	1.56	0.766	
451	32.7	AlN (d)	1.28	2.9	1.425	
452	4.06	LDO (e)	0.34	0.77	0.377	
440	17.3	Al	0.22	0.52	0.295	0.205
406	36.8	AlN	2.22	5.0	2.47	
441	17.3	Al	0.22	0.52	0.295	0.205
408	12.7	SiO2	0.69	0.77 (g)	0.766	
409 (f)	32.7	AlN (d)	1.28	2.9	1.425	
410	12.7	SiO2	0.69	1.56	0.766	

Notes:

(a) Refer to Fig. 4 and Fig. 6 for layer designations

(b) Mechanical impedance in units of (1E5cm/sec)(gm/cm3)

(c) Layer thickness in units of micrometers
Reflector and coupler layers are quarter wavelength thick at center frequency. For Fig. 11, the quarter wavelength frequency is 1920 MHz.

(d) Polycrystalline form of AlN, non-piezoelectric

(e) Low density oxide used as low dielectric constant isolation layers in microelectronics.

(f) From 409 to the substrate are eight quarter wavelength thick layers in the 409/410 materials sequence.

(g) LDO material in this layer

(h) For filter 91

(i) For filter 92 showing only values changed from those for filter 91.

Fig. 12